

CLAIMS

What is claimed is:

- 5 1. A method of making olefins, comprising contacting an oxygenate feed with at least two different zeolite catalysts to form an olefin composition.
2. The method of claim 1, wherein the oxygenate feed contains at least 70 wt.% oxygenate.
- 10 3. The method of claim 1, wherein the oxygenate feed contains at least 80 wt.% oxygenate.
4. The method of claim 1, wherein the oxygenate feed contains at least 90 wt.% oxygenate.
- 15 5. The method of claim 1, wherein at least one of the zeolite catalysts contains a ZSM-5 molecular sieve.
- 20 6. The method of claim 5, wherein the ZSM-5 molecular sieve is selected from the group consisting an unmodified ZSM-5, a phosphorous modified ZSM-5, a steam modified ZSM-5 having a micropore volume reduced to not less than 50% of that of the unsteamed ZSM-5, and mixtures thereof.
- 25 7. The method of claim 1, wherein at least one of the zeolite catalysts contains a 10-ring zeolite molecular sieve.
8. The method of claim 1, wherein at least one of the zeolite catalyst contains a zeolite molecular sieve selected from the group consisting of ZSM-22, ZSM-23, ZSM-35, ZSM-48, and mixtures thereof.
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9. The method of claim 1, wherein at least one of the zeolite catalysts contains one of the zeolite molecular sieve selected from the group consisting of ZSM-22, ZSM-35, and mixtures thereof.

5 10. The method of claim 1, wherein at least one of the zeolite catalysts contains a ZSM-35 molecular sieve.

10 11. The method of claim 1, wherein the zeolite catalysts comprise a zeolite catalyst containing a ZSM-5 molecular sieve and a zeolite catalyst containing a ZSM-22 or a ZSM-35 molecular sieve.

12. The method of claim 1 or 11, wherein the oxygenate feed is contacted with the zeolite catalysts mixed together in one reactor.

15 13. The method of claim 1 or 11, wherein the oxygenate feed is contacted with the zeolite catalysts in a first bed containing a first catalyst containing ZSM-5 molecular sieve and a second bed containing a second zeolite catalyst containing molecular sieve selected from the group consisting of ZSM-22, ZSM-35, and mixtures thereof.

20 14. The method of claim 1 or 11, wherein the oxygenate feed is contacted with the zeolite catalysts in separate reactors in series.

25 15. A method of making an olefin composition comprising:
contacting an oxygenate with a first zeolite catalyst to form an olefin product;
separating a butylene containing stream from the olefin product;
and
30 contacting the butylene containing stream with a second zeolite catalyst to form a second olefin product.

16. The method of claim 15, wherein the butylene containing stream contains at least 20 wt.% butylene.

17. The method of claim 16, wherein the butylene containing stream contains at least 40 wt.% butylene.

18. The method of claim 15, wherein the butylene containing stream contains at least 50 wt.% butylene.

19. The method of claim 15, wherein the first zeolite catalyst comprises a ZSM-5 molecular sieve.

20. The method of claim 19, wherein the ZSM-5 is selected from the group consisting of unmodified ZSM-5, a phosphorous modified ZSM-5, a steam modified ZSM-5 having a micropore volume reduced to not less than 50% of that of the unsteamed ZSM-5, and mixtures thereof.

21. The method of claim 15, wherein the second zeolite catalyst comprises a zeolite molecular sieve selected from the group consisting of ZSM-22, ZSM-35, or a mixture thereof.

22. The method of claim 21, wherein the first zeolite catalyst contains a ZSM-5 molecular sieve and the second zeolite catalyst contains ZSM-22 or ZSM-35 molecular sieve.

23. The method of claim 15 or 22, wherein the oxygenate is contacted with the first zeolite in a fluidized-bed or riser reactor.